# Reply Report

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This report responds to comments made in declarations and reports of several economists filed in the opening comments of this proceeding.

## The "Clean-Slate" Assumption

The Commission's rules applicable to the pricing of unbundled network elements require states to assume that the "most efficient telecommunications technology currently available" is used throughout the network.[1] Nevertheless, in the NPRM the Commission observes, "it is unlikely that any carrier, no matter how competitive the marketplace, would deploy new technology instantaneously and ubiquitously throughout its network."[2]

A number of commentators in the current proceeding have seized on this "clean-slate" assumption to argue that, because real-world firms do not instantly and ubiquitously adopt the latest technology, the TELRIC methodology for calculating forward-looking costs is fundamentally flawed:

> "[T]he assumption of instantaneous replacement in the face of persistent technological advance was inconsistent with how competitive firms operate …"[3]

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[1] 47 C.F.R. sec. 51.505(b)(1); NPRM at 67.

[2] NPRM, at 68.

[3] Verizon Comments, Exhibit 2, Declaration of Albert E. Kahn and Timothy Tardiff, p. 11.

> "[A] real-world ILEC frequently skips one or more generations of new technology and plant and equipment when upgrading its network. Indeed, a plan of continuous and seamless network replacement can actually be more costly and less efficient than one where upgrades occur discontinuously or selectively."[4]

> "[I]f a new technology will itself be superseded, it might be less costly in the long run for the firm to wait until the superseding technology arrives – in essence to skip a generation of technology and to wait for something even better. If, on the other hand, the incumbent instantaneously and ubiquitously deployed every new technology, it likely would be left with stranded plant and unrecoverable sunk costs."[5]

> "While the hypothetical blank slate carrier of TELRIC can avoid such costs [of interoperability with legacy technology] by installing a single vintage or type of equipment, real carriers that build and upgrade their plant over time cannot."[6]

However, in making these criticisms the commentators have missed the essential point. The TELRIC methodology does not purport to model the *behavior* of actual firms. Rather, it is intended to characterize the *prices* that would prevail in a competitive market in which new technology becomes available.

> "The theory behind TELRIC, and the proper implementation of this theory, does not imply that firms in a competitive market will discard old technology immediately, but rather that the value of the old technology equipment will decline commensurately, and the prices of the services

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[4] BellSouth Comments, Declaration of NERA Economic Consulting, p 24.

[5] Verizon Comments, Declaration of Howard Shelanski, p. 6.

[6] SBC Comments, Debra J. Aron and William Rogerson, *The Economics of UNE Pricing*, pp. 20-21.

> provided by this equipment will decline, as a result of the emergence of a 'better mousetrap.'"[7]

> "[I]t is indeed true that the FCC requires cost calculations to be based on the outlays that would be entailed if the technology employed were the most efficient currently available, and that it does preclude use of embedded cost figures. But this is precisely what a competitive market *always* does."[8]

The Commission's TELRIC methodology accounts for the effect of new technology on the prices of network elements by calculating the cost of a network designed to use the latest technology. In a competitive market, the supply of telecommunications services by a firm using the most efficient technology would set the price for services from other firms in the market, regardless of the technology they employed to produce those services. When there are increasing returns to scale in network capacity, a competitive market may not exist. Nevertheless, the concept of the "prices that would prevail in a competitive market" should be understood to be prices that provide efficient entry and investment signals, so that efficient incumbents and potential entrants earn only a normal economic profit. Such TELRIC prices would then emulate the prices of a competitive equilibrium.

It would be consistent with the Commission's forward-looking cost approach to construct a highly detailed cost model of an ILEC network, one that explicitly incorporates multiple generations of technology and then determines efficient investment decisions, including options to continue operating older equipment and to skip a

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[7] MCI Comments, Declaration of Michael D. Pelcovits, p. 14.

[8] WC Docket No. 03-173, *Ex Parte Filing* of AT&T, William J. Baumol, TELRIC-Based Prices are Compensatory Payments, p. 2.5 (emphasis in original)(Dec. 4, 2003).

generation of technology. As noted by Pelcovits, such a multi-generation, forward-looking cost model would be substantially more complex that the static TELRIC models developed by the Commission and network operators.[9] The multi-generational model would need to estimate the economic value of all of the ILEC's equipment and take into account how the value of each item of equipment is constrained by the cost of the most efficient technology.

If such a multi-generation empirical model of efficient network investment and operations could be constructed and estimated accurately, it should generate forward-looking costs that correspond to the values from a clean-slate TELRIC model. However, to date only theoretical multi-generation technology models of efficient ILEC investment have been constructed.[10]

**Economic Depreciation**

The Commission's TELRIC methodology takes into account the durability of assets and appropriately requires that forward-looking costs be calculated using *economic depreciation* of assets.[11] Economic depreciation measures the change in the market value of assets in each period of their useful life.

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[9] Pelcovits Declaration, p. 16.

[10] In the UK, a long-run incremental cost model of the mobile telephone sector was developed for the regulator (Oftel) that incorporates both second-generation and third-generation wireless technologies, demand growth, and economic depreciation. Documentation is archived at http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/ctm_2002/analysis300102.pdf.

[11] 47 C.F.R. sec. 51.505(b)(3); NPRM at 92-93.

The revaluation of older-generation assets that would be required in a forward-looking multi-generational model would be an instance of economic depreciation. In a competitive market the availability of a new, lower-cost technology causes a revaluation of all existing assets, including all assets that incorporate earlier technologies. When the new technology becomes available, the values of the existing assets of a real-world network operator are immediately reduced. The operator may, indeed, continue to use older technology, and to operate the network efficiently with several different vintages of equipment. The economic value of that older equipment, however, will be determined by the cost of acquiring and using the latest technology, not by the originally incurred investment cost or by the value calculated from accounting formulas and carried on the firm's books.

The introduction and availability of broadband access technology is a particular instance of the economic depreciation of legacy copper-loop assets that affects the efficient pricing of UNEs. The Commission asks whether a price based on forward-looking costs is still appropriate for a copper loop that is leased to a CLEC and has otherwise been replaced by a fiber loop.[12] Some commentators have asserted that:

> "The long-run forward-looking cost of the [copper] loop should appropriately be based on its replacement cost, whether or not it has been depreciated fully on the ILEC's books."[13]

This conclusion is unwarranted. In a competitive broadband access market (which would include services provisioned by wireline, cable, and wireless technologies) an efficient ILEC's investment in wireline broadband access loops would yield a

[12] NPRM, at 43.

[13] NERA, p. 19.

competitive return – a return realized from the sum of the revenues of the various broadband and narrowband services delivered over such loops. The market value of the ILEC's earlier-generation copper loops would not be determined by the cost of constructing new copper loops. Instead, the value of copper loops would be determined by the return attributable to the narrowband services when they are provided in combination with other services over the new broadband technology. The answer to the Commission's question, then, is that forward-looking costs remain appropriate to efficient pricing of copper loops as well as of other network elements. In this case, the correct forward-looking calculation of the TELRIC of legacy copper loops would result in a cost that is below the long-run incremental cost of constructing new copper loops.

**Price Caps**

The Commission requested comment on whether an ILEC's operations and costs should be "presumed efficient" based on the incentives provided by price cap regulation.[14] ILEC commentators in this proceeding have generally argued that such a presumption is warranted.[15]

The incentives under rate-of-return regulation for ILECs to install excessively capital-intensive plant and equipment and choose inefficient technologies have been

[14] NPRM, at 58.

[15] Qwest Comments, Dennis L. Weisman, *The Theoretical Economic Principles Underlying TELRIC*, p. 22; Kahn and Tardiff, p. 7; NERA, p. 31.

widely acknowledged.[16] Recognition of the significance of those distortions ultimately led federal and then state regulators to shift over a period of years to various forms of incentive regulation of the ILECs.

However, the federal and state price cap plans vary in both their coverage and the extent to which the plans dilute the incentives for efficient behavior with ex-post adjustments of productivity factors and low-end adjustments that protect earnings.

Whatever efficiency incentives have resulted from the shift to price cap regulation of ILECs in recent years, those incentives were not operative during much of the time in which the long-lived local loop plant was designed and installed. Much of the ILECs' outside plant, therefore, cannot be considered to be "presumptively efficient". Basing estimates of local loop costs on the design and capacity of an ILEC's actual feeder and distribution network would not yield efficient forward-looking prices.

[16] H. Averch and L. Johnson, "Behavior of the Firm under Regulatory Constraint," Amer. Econ. Rev., 52 (1962) 1052-1069; D. E. M. Sappington, "Price Regulation" in *Handbook of Telecommunications Economics* Vol. 1, M. E. Cave, S. K. Majumdar and I. Vogelsang, eds., Elsevier, Amsterdam, 2002.